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M. E. McIVER, Editor

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The Engineer and His Ethics

By M. E. McIver, Editor, Professional Engineer

The Association has received so many inquiries of late regarding the subject of ethics, requests for copies of Ethical Codes, data on Professional Conduct, that we thought it might be interesting to review the work done on the subject by the American Association of Engineers.

"TO RAISE the standards of ethics of the engineering profession" was one of the original objectives of American Association of Engineers. It would, perhaps, be more accurate to term it an ideal, because the Association's first approach was a thoroughly idealistic one. The founders of American Association of Engineers were imbued with fraternalism and idealism. These were the qualities which they quite implicitly believed would be the lodestones to draw into the association men like themselves. Pledges, rituals, semi-mystic ceremonies of allegiance to ideals governed many organizations at that time, not only such service clubs as Rotary, Kiwanis, and Lions, but Chambers of Commerce, Advertising Men's Clubs and organizations composed of doctors, dentists, and lawyers. A.A.E.'s founders were not unique in the faith they reposed in a "ritual" as the safeguard of ethics in their profession.

Members, at this time, were not merely enrolled. They were inducted into membership by "degree teams" who traveled all over the Metropolitan Chicago area, performing rites which were supposed and expected to build in every new chapter the kind of "fellowship" which characterized the Alpha Chapter in Chicago. This ritual, theoretically, imposed upon every member the obligation to be, in some degree, his brother's keeper. At the same time, the founders of A.A.E. realized that they needed a very practical definition of "ethics"—some specific rules governing the relationship between engineers and other engineers, and also between engineers and their employers. Having required every engineer member to take an oath binding him to the ideal, the Association set up its first "code," interpreting the "ritual" in terms of specific human relationships.

The First A.A.E. "Code"

"1. The A.A.E. shall solicit and secure the confidence of the employers by offering them efficient, competent and loyal help.

"2. It should help its members by all fair means and without charge to the employer or member to obtain a position and compensation befitting the man and his qualifications.

"3. It should reprimand any member guilty of unethical conduct toward his employer or toward the profession.

"4. It should absolutely repudiate such methods as intimidations, strikes and insubordination, and should condemn any dishonest method used by some employment agencies. It should discourage supplying any member a change of position without his previous written request for the change.

"5. It should expect each member to merit a just recompense for services rendered, by giving a fair day's work for a fair day's pay, being prompt and industrious, thereby making possible a profit to the employer to this efficiency and then each member should demand such just recompense.

"6. Each member should remember that the employer, whether he be a corporation, a municipality or an individual, is OUR customer and a satisfied customer is our asset."

It is interesting to note that the 1916 Conference on Engineering Cooperation, a movement fathered by Dr. Frederick H. Newell,* and aided by A.A.E., had nothing to say about ethics as such, but when the Conference Committee met in 1917 for the purpose of affiliating all local engineering societies in one organization, or forming an alliance of national bodies that would handle matters of business and professional interest for engineers, it made the following recommendation in respect to Ethics:

---

*Director of the U.S. of Reclamation Service. Nationally known as the "father" of Reclamation, a past president of A.A.E.

* * *

"Each local engineering society should adopt and frequently make application of a code of ethics prepared in accordance with the standards established by the national organizations or approved by other professional bodies. It is recognized that while it is impossible to prevent all violation of such a code, yet eternal vigilance is the price of maintenance of high standards. The enforcement of such a code is essential to the well-being of the community at large, as well as for the protection of professional men from the improper competition of unskilled or unscrupulous men tending to reduce the opportunity for effective service to individuals and to the public."

* * *

However, the recommendation was weak because the national bodies had themselves formulated no specific principles. Available codes were inspirational or in general character.

In 1918 A.A.E. held its convention jointly with the Committee on Engineering Cooperation. Two A.A.E. members were spokesmen for both organizations with references to accomplishments and purposes in the field of ethics. Isham Randolph, Chairman of the Committee on ethics and cooperation of the joint body, reported largely on the accomplishments of A.A.E., and Morris L. Cooke, Consulting Engineer, strongly influenced the proceedings by the following letter:

"To be perfectly frank, I have been unable to discover that any engineering organization—either in this country or abroad—has a code of ethics which, on being reviewed by a disinterested public, could bring credit or prestige to us. These codes of ethics without exception busy themselves with the details of such relationships as those codes prohibit conduct which might under the common law be made a basis for litigation before a police court . . .

"It makes me very proud of my association with the A.A.E. to note on every piece of literature which I receive from the society that the promotion of a high standard of professional ethics is one of its essential aims.

"The time seems altogether ripe for the formulation of a true-blue and inspiring code of ethics for engineers. This does not seem to me the work for a committee. Committee work is necessarily accomplished to a greater or less degree by compromise, and we do not want compromise in ethics. We want the ideal set just as high as our concept of the responsibility of an engineer will permit.

"Until we engineers can place the service of humanity as the significant and dominant plank in our platform, the profession will continue to have the status of the hired servant, and veer here and there as the winds of business and other special interests may dictate.

"This is the time for moral leadership. If the A.A.E. can provide it, its future is assured."

* * *

Mr. Cooke's suggestion was adopted and a Committee of One was appointed in May, 1919, to prepare the code. Col. Isham Randolph was that Committee and he gave the Association and the Profession its first real Code of Ethics.

Professional courtesy should constitute a part of the Code of Ethics of every profession. It should not only be practiced between members in their professional relations, but also among organizations within the profession.

The Profession's First Code of Ethics

By Isham Randolph

ANY code of ethics must be predicated upon the basic principles of truth and honesty. "Whatsoever things are true, whatsoever things are honest," are the things for which engineers must contend.

An engineer may not "go beyond and defraud his brother" by any underhanded act or method. He may not do or say anything which will injure his brother's reputation or his business for the purpose of securing his own advancement or profit. This admonition carries with it no obligation to refrain from telling known and absolute truth about an unworthy brother, as a protection to others; but the truth so told must be such as can be substantiated, and he who tells it must have the courage which will not shrink from the consequence of his telling.

The engineer owes his client allegiance demanding his most conscientious service. But conscientious service to the client must never entail a surrender of personal convictions of truth and right.

An engineer who receives compensation from an employer may not receive gift, commission or remuneration of any kind from a third party with whom he does business for that employer.

An engineer seeking to build up his business may not resort to self-laudation in advertising. He may state briefly the lines of work in which he has had experience, and enumerate responsible positions which he has held and give his references.

An engineer who employs others, either in his own service or in that of the client who employs him, should recognize in his relationship to them an obligation of exemplary conduct, of helpfulness and personal interest in those with whom he is thus brought in contact, and he should discharge such obligation tactfully and kindly.

The honor of the profession should be dear to every engineer, and he should remember that his own character and conduct reflect honor, or the reverse upon the profession.

If, then, he so lives that his own honor shall never be smirched by his own act or omission, he will thus maintain the honor of the organization to which he belongs.

The Code did not particularize upon its general precept of fairness to "brother engineers" beyond forbidding an engineer to indulge in criticism of another member of the profession. Soon it became apparent that there were many ways in which engineers were injuring each other, and to deal with those instances which were flagrant violations of generally accepted principles, the Practice Committee was organized in 1919.

The Association's Committee on Services and Salaries of Practicing Engineers became a proving field for the flight of ethical ideas enunciated by the Practice Committee. The preliminary report of that committee submitted by Col. Webster L. Benham, President, Benham Engineering Company, revealed that the basic task of the organization would be the establishment of certain ethical principles covering conduct of engineers in independent practice with reference to methods of selling their services.

In 1923 the Practice Committee compiled the "Specific Principles of Good Professional Conduct" under the chairmanship of W. E. Carpenter, later revised under the chairmanship of Dr. David B. Steinman, eminent bridge engineer.

Specific Principles of Good Professional Conduct

The compilation consists of four parts as follows:

Part I. Relations of the Engineer to the Public.

Part II. Relations of the Engineer to Clients and Employers.

Part III. Relations of the Engineer to Employees.

Part IV. Relations of the Engineer to other Engineers.

Part I

Relations of the Engineer To the Public

1. The Engineer should regard his duty to the public welfare as paramount to all other obligations.

2. He should not use his professional standing as a means of sponsoring or promoting commercial or other undertakings of a speculative character.

3. He should scrupulously avoid connection, by act or omission, with any illegal or questionable undertaking or participation in any enterprise inimical to the public welfare.

4. He should not advertise in self-laudatory language or in any other manner derogatory to the dignity of his profession.

5. He should avoid any publicity giving the impression that technical service in technical matters can be dispensed with; or that technical proficiency along any line is easy of acquisition; or that exaggerated returns may be expected from any limited course of technical instruction.

6. He should avoid any questionable statements or any statements couched in language that would convey a false impression, in any of his reports, advertisements, or articles.

7. He should avoid contingent fees as tending to prejudice the quality of the service which he renders; when retained to report on a property or project he should be scrupulously careful to make no business arrangement for compensation or otherwise that might tend to bias his report.

8. The Engineer should strive to give a full measure of service for the best interests of his client and of the public, and should charge fair and adequate fees for such service. He should maintain the professional attitude in negotiations for his services; and he should avoid all practices which have a tendency to affect adversely the amount, quality or disinterested nature of professional services, such as charging inadequate fees, competing on a price basis where (as is almost invariably the case) the service to be rendered or the character of its proper performance cannot be precisely defined, spending large amounts of money in securing business, or consenting to furnish monetary guarantees of cost estimates.

9. The Engineer should use every care to make his estimates accurate and reliable, and in particular, should guard against allowing self-interest to lead him into making an inadequate estimate.

10. He should refrain from using any improper or questionable methods of soliciting professional work.

11. He should participate in clean politics and should strive to be a force to assist in the cleansing of politics.

12. He should take an active interest in the public welfare in behalf of which he should ever stand ready to volunteer his special knowledge, skill and training for the use and benefit of mankind.

PART II

Relations of the Engineer To Clients and Employers

1. The engineer should pursue his professional work in a spirit of strict fidelity and full loyalty to his clients and employers.

2. He should inform a client or employer of any business connections, interests or affiliations which might tend to influence his judgment or impair the disinterested quality of his services.

3. He should accept compensation for his services in connection with any work from one source only, except with the full knowledge and consent of all the interested parties.

4. He should hold as confidential such information relating to the business or technical affairs of a client or employer as the latter regards or may be presumed to regard as personal or proprietary.

5. He should not engage in any outside work without the full knowledge and consent of his employer.

6. When connected with any work, he should not accept commissions, outside employment, promise of employment or any other consideration from a contractor engaged upon that work.

7. He should have no business dealings or connections with any client of his employer without the full knowledge and approval of his employer.

8. He should entertain no offers of employment or other considerations from a third party, when such may in any way influence his actions or decisions with respect to the relations which may exist between such third party and the Engineer's employer or client.

9. He should not accept commissions or other considerations for specifying or recommending supplies, equipment or service.

10. He should not pay commissions to others for recommending his services to prospective clients.

11. He should have no interest direct or indirect in any materials, supplies or equipment used in the construction work of his client or in any firms receiving contracts for his client's work without informing his client in advance of the nature of such interest and obtaining his sanction.

12. He should not engage in the independent practice of engineering without the knowledge and sanction of his employer, and under no circumstances should he compete with his employer on the basis of lower fees.

PART III.

Relations of the Engineer To Employees

1. The Engineer should treat his employees or subordinates in a spirit of fairness, with due regard and consideration for their personal welfare and professional advancement.

2. There should be a professional bond between employer and employee when both are engineers, which will dictate and impel reciprocal interest and mutual consideration.

3. The Engineer should pay adequate salaries commensurate with the importance and responsibility involved in the service.

4. He should encourage the professional pride of his employees or subordinates in their work and should offer them every means of protecting their reputations and the quality of the work entrusted to them by not interfering with the proper performance of the duties for which they are responsible.

5. He should recognize the freedom of his employees to change employment and should in no way hinder employees or subordinates on bettering their condition.

6. He should not discharge an employee, nor withhold employment from him, nor discriminate against him in any way on account of his affiliations or activities in any professional, political, or religious organization.

7. He should respect his employee's right to freedom of thought, speech, and outside activity as long as the same does not impair the efficiency and value of the employee's service.

8. He should see that his employee is adequately covered by insurance against risk of casualty arising from his work.

9. In advertising or offering employment, he should refrain from any misrepresentation as to the conditions and permanency of such employment.

10. If in public employ, he should assume the responsibility of consistently protecting the interests of his subordinates.

11. He should make every effort to provide steady employment for his employees and when forced to discharge an employee he should give the most generous notice possible and exert every reasonable effort to assist the employee in finding another position.

PART IV.

The Engineer's Relations To Other Engineers

1. The Engineer should not by word, act or omission, injure falsely or maliciously, directly or indirectly, the professional reputation, prospects or business of another Engineer.

2. He should not attempt to supplant another Engineer after definite steps have been taken toward his employment.

3. If employed in conjunction with another Engineer, and by the same client, he should not review and comment conclusively upon the work of the other Engineer except with his full knowledge and consent or unless the connection of such other Engineer to the work has been previously terminated.

4. He should not use unfair means to effect his professional advancement or to injure the chances of another Engineer to secure and hold employment.

5. He should not attempt to inject his services into a project at the expense of another Engineer who has been active in developing it.

6. He should not interpose between other Engineers and their clients when unsolicited. When solicited, he should avoid any possibility of doing a brother Engineer an injustice.

7. He should not seek or solicit a position occupied by another Engineer.

8. He should not attempt to secure work on the basis of lower salaries or fees.

9. He should be courteous, fair, considerate in his dealings with other Engineers.

10. He should conduct any necessary comment on or criticism of the work of other Engineers with careful regard for the good name and dignity of the engineering profession, and he should scrupulously refrain from criticism to personal advantage, as in negotiating for an engagement.

11. He should not commercialize his affiliations with, or official position in, any technical organization.

12. He should not use his professional affiliations to secure the confidence of other Engineers in speculative commercial enterprises.

13. As a member of any professional organization, he should avoid any act tending to promote his own interest at the expense of the dignity and standing of the organization.

14. As an officer of a professional organization, he should sedulously avoid any appearance of using his position for personal advertising.

15. He should cooperate in upbuilding the engineering profession by exchanging professional information and experience with his fellow engineers and students of engineering, and by contributing to the work of engineering societies, schools of applied science, and the technical press.

16. He should regard himself as a debtor to his profession and should dedicate himself to its advancement.

In 1929 the Committee on Services and Fees of Practicing Engineers brought out its booklet entitled "How to Employ and Use the Services of Practicing Engineers." The Committee decided that instead of the "Specific Principles" which had been evolved from A.A.E. Practice Cases, there would be incorporated in the booklet the corresponding Code of Practice of the American Society of Civil Engineers (adopted by that organization in 1927). Several considerations actuated the Committee on Services and Fees, some of which are incorporated in the introduction to this section of the booklet, as follows: "This code has been carefully thought out and constitutes a very practical statement of the ethical considerations which should govern practicing engineers. In the interest of uniformity and to avoid duplication of effort, this code of practice is adopted by the American Association of Engineers."

Other considerations were: the A.S.C.E. Code was the most recent of the enunciations of principles and incorporated the best that was found in all the earlier statements of principles; A.A.E.'s code which the committee in its 1924 recommendation planned to incorporate was regarded as a growing institution, amplified by the annual findings of the Committee and for purposes of a permanent guide would have required revision, amplification, and polishing; the very incorporation of the A.S.C.E. Code was a gesture indicative of a true inclination toward cooperation with all the Founders Groups—a happy opportunity to demonstrate the advisability of identity wherever possible in any major welfare activity.

Remembering the suggestion of one of the early presidents of the Association, Garrison Babcock, that the Association should adopt a Vow of Service, the membership was invited in 1925 to submit a form of vow—a Hypocratic oath, so to speak.

A number of proposed Vows were submitted to the Annual Convention held in Philadelphia, and the Board of Directors in that year selected the "Engineers' Vow of Service" reproduced on page 4 in this issue, as the most outstanding.

N.C.S.B.E.E. Meeting

Colonel Walter R. Jeffrey and Professor Arthur W. Hershey attended the annual meeting of the National Council of State Boards of Engineering Examiners, as representatives of A.A.E. held in the Congress Hotel on October 9, 10, and 11.

North Idaho

The boys at North Idaho are having a busy year, meeting regularly and carrying on the same interesting program of activities as they did last year. Dexter H. Moser, head of the Engineering Department, is responsible for the group's affiliation with A.A.E.

Illinois Engineering Council

Officers elected to serve the Illinois Engineering Council for 1951 are: President, Alois W. Graf; first vice president, G. C. Laughlin; second vice president, R. A. Lonier; and secretary-treasurer, John A. Harrington, 72 W. Adams Street, Chicago 90.

The council is composed of sixteen local, state and regional engineering societies, all active in the state of Illinois. Objects of the council are "To further the public welfare wherever technical and enginering knowledge and experience are involved, and to consider and act upon matters of common concern to the engineering and allied technical professions."

William R. Sipfle, director, representing A.A.E., is a member of the Committee on Public Affairs; Ellis Danner and W. J. Mauer, A.A.E., are members of the Committee on Publicity and Publications.

Worcester Junior College

This year the Student Chapter at Worcester Junior College, Worcester, Mass., is officered by the following Engineers of tomorrow: President, David Garr; Vice President, Don Bartlett; Treasurer, J. McGinnis and Secretary, R. Tomlian. The Club was affiliated with A.A.E. in 1949. John Elberfeld is Dean of the College and Paul J. McCarron, is instructor of Physics and a Senior Member of the American Association of Engineers.

Chicago Chapter

Chicago Chapter has had some inspirational and informative meetings during the past few months. A Fellowship hour is held in advance of the dinner, and the meeting follows. They are always well attended because the program committee has arranged for interesting speakers. Enjoyed especially was the film shown by Perry Ball of the Chicago Tribune, entitled "Trees to Tribune," and the colored slides on Mexico presented by Slater B. Carpenter, head of the Visual Service Company.

On January 5 the group gathered for a pleasant evening at Sieben's Brewery and on January 26 one of the finest meetings of the season was held with Thomas A. Hendricks, secretary of the American Medical Association Council of Medical Service, as principal speaker. He took as his subject "Management Setup of the AMA," and gave his listeners a thumbnail sketch of the history of the AMA, its early trials and tribulations, its early financing problems, its operations and its accomplishments throughout the years.

At the February meeting, Charles Falkenberg will speak to the engineers on Banking, Finance and Credit — which should be most interesting.

Peter L. Loewe is president of the chapter; David W. Dunning, vice president; Donald Mackintosh, treasurer, and Arthur G. Zimmerman, secretary. New directors elected this year, are Franz Schulze, Marvin E. Cox and Charles F. Martin, past president.

To Secretary Zimmerman goes the credit for the Chapter's snappy monthly news bulletin—the CCAAE-NEWS. It is a two-page mimeographed edition announcing the meetings, giving news of the members, carrying bits of advice and some little squibs, very well selected, to give the reader a chuckle or two. For example, here are two that seemed particularly fitting for an engineer's publication:

I believe that the only thing in this world that can't be stopped is a sound idea. . . . Douglas MacArthur.

A human brain is a wonderful thing. It starts working the moment you are born, and never stops until you stand up to speak in public.

The new chapter bulletin is exceptionally well written and prepared. While we don't want to take away any of the credit from Secretary Zimmerman, we must give his charming wife a pat on the back for her co-operation in cutting the stencils, and assisting in the arrangement. Thanks, Mrs. Zimmerman, for a job well done!

Peter Loewe, President, Chicago Chapter and Arthur W. Hershey, chairman, Wage Scale Committee

A group of Chicago Chapter Members at dinner

San Bernardino Chapter

Monthly dinner meetings rotating among local centers continue the fashion in San Bernardino. The meetings are well attended and afford excellent opportunities for good fellowship. George D. Roberts, president of Monorail Engineering and Construction Corporation, is the scheduled speaker for the February meeting which will be held at Phil's Charcoal Broiler, near Redlands. The March meeting will be held in San Bernardino, F. Royal, Chairman.

Long Beach

The January meeting was held at the University Club. Ralph Gobles, Electronic Engineer, Eastman Oil Well Surveys, discussed Oil Field Survey Instrumentation. Meredith W. Chatten, is president of the group; Horace C. Sherer, vice president; Robert E. Latham, secretary, and Norbert W. Dean, treasurer.

New Haven YMCA

New Haven Y.M.C.A. Junior College chapter continues to carry on the aims and ideals of the Association under the leadership of the following: Chairman, Thad M. Hasbrouck; vice chairman, Harold S. Jennings; Corresponding Secretary, Frank A. S. Elliott; Recording Secretary, Charles Ryan; and Treasurer, John Kerpchar. Ira G. Hubbell is the Chairman of the Chapter's Membership Committee, and Peter J. Bertier, was appointed by the group as chairman of the program committee, but since Peter has been called to service by Uncle Sam, Frank Elliott is acting chairman temporarily. Dr. Walter R. Hibbard, Jr., Chairman, Engineering Division, is faculty sponsor of the student group.

Peoria Chapter

At the helm for Peoria Chapter this year is Vernon F. Barr. Vice President is James H. Steele. Earl L. Mowder is serving as Secretary and Treasurer, and he is starting off his year in ship-shape form. Two new directors have been elected: Leon C. Scott for the two year term and Clarence Rhode for one year.

Get expert advice in solving your rolling mill problems . . .

The ROLLING of METALS

Theory and Experiment

Volume I. By L. R. Underwood, Chief Engineer, Rolling Mill Department, W.H.A. Robertson & Co., Ltd., England. Dr. Underwood reviews the basic principles of the rolling of metals, and indicates their bearing on practical rolling problems. His book is based on a comprehensive study of the literature and of many recent theoretical and experimental investigations.

A distinguishing feature of *The Rolling of Metals* is that it treats the subject of rolling as a unified whole and stresses the relationship among the factors involved in the phenomena of rolling. The chief subjects covered in Volume I include forward slip, friction between the rolls and material, friction hill theories of rolling, and methods, based on these theories, of calculating the rolling load.

1950 344 pages 142 illus. $6.50

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8 So. Michigan Ave., Chicago 3, Ill.

Book Reviews

Theory of the Interior Ballistics of Guns, by J. Corner, M.A., Ph.D. John Wiley & Sons. $8.00.

Theory of the Interior Ballistics of Guns is a blend of classical theory and methods with the results of post-war research. Four types of systems are covered in this new book, and at least one method of each type is described in sufficient detail for the reader to start using it. Dr. Corner supplies the necessary tables and explains how the different methods are related.

How to Plan Pensions, by Carroll Boyce, Assoc. Editor, Factory Management and Maintenance. McGraw-Hill Book Co. $5.

With "pensions" the keynote of much business and industrial activity today, this timely book fills a pressing need. Written in forceful and informative style, it answers many questions on all aspects of the pension planning problem. It is a guidebook for business and industry, giving examples of typical pension plans.

Survey of Modern Electronics, by Paul G. Andres, B.S., E.E., Assoc. Prof., Electrical Engrg., Illinois Institute of Technology. John Wiley & Sons. $5.75.

This book explains the fundamentals of electronics and provides a summary of applications. The fundamentals and technical details are correlated very closely with their application in industry. It demonstrates the vital importance of electronics in nearly all branches of science and engineering. An excellent textbook for a short course in electronics.

Contemporary Structure in Architecture, by Leonard Michaels, M.A., A.R.I.B.A. Reinhold Publishing Corp. $10.00.

Every major structural system is carefully analyzed and compared with other systems. The first part of the book considers the skeleton frame, and the balance of the book deals with architectural design. The author relates structure to plan, section and massing, and points out the importance of considering structure in designing contemporary buildings. The book contains 259 photographs and 75 drawings to illustrate all the structural methods now available to the architect and engineer.

Engineering Economy, by H. G. Thuesen, Head, School Ind. Engrg. and Mngt., Okla. A & M. Prentice-Hall. $6.65.

Engineering is essentially a means of obtaining desired results with economy. One purpose of this book is to aid the engineering student to extend to economy the application of factual analyses in which he is proficient; the other, to develop an attitude that will cause him to approach engineering problems with regard for their economic as well as their physical implications. Numerous approaches and methods of analyses are presented, most of which are illustrated by concrete examples. An interesting book on an important subject.

Atom Energy, Pocket Encyclopedia of, by Frank Gaynor. Philosophical Library. $7.50.

The purpose of this book is to present a comprehensive collection of brief explanations and definitions of concepts and terms in the field of Nuclear Physics and Atomic Energy to the scholar, researcher, teacher, librarian, student and intelligent layman. Over 2.000 entries, charts, tables and illustrations.

Structural Theory, by Hale Sutherland and Harry Lake Bowman. 4th Ed. John Wiley & Sons. $5.00.

As in the previous editions, this volume is concerned chiefly with the study of structural stress analysis, although some important additions have been made. Some of the material has been rewritten to bring it up to date. Major revisions occur in the chapters dealing with slope and deflection and rigid frames.

Capacitors for Industry, by W. C. Bloomquist, editors, C. R. Craig, R. M. Partington and R. C. Wilson. John Wiley & Sons. $4.50.

Although capacitors are exceptionally useful, their utilization in industry has been limited by a lack of practical application information. The aim of this book is to present this necessary information in readily usable form. The book should be valuable to the industrial plant engineer and electrician, utility power salesman, consulting engineer, and industrial power application engineer.

Materials of Construction, by John H. Bateman, Prof., C.E., La. State Univ. Pitman Publishing Corp. $6.50.

A textbook for students of engineering, giving him a background of knowledge of the raw materials, production, and properties of the principal materials of construction. A well-written treatise, over 500 pages, with useful bibliographies and questions and problems on various subjects.

Petroleum Production Economics, by Lester C. Uren, Prof., Petroleum Engineering, Univ. of California. McGraw-Hill Book Co. $7.50.

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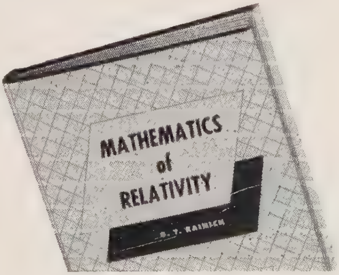

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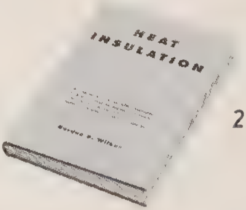

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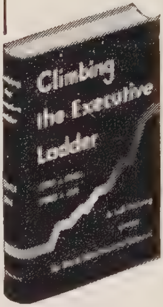

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Electrical Communication, by Arthur L. Albert, Prof., Communication Engrg., Oregon State College. 3rd Ed. John Wiley & Sons. $6.50.

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The Properties of Metallic Materials at Low Temperatures, by P. Litherland Teed, Associate, Royal School of Mines. John Wiley & Sons. $3.50.

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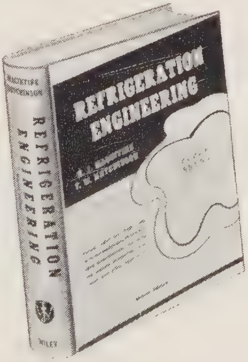

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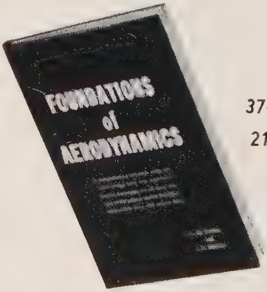

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Foundry Science, by Harry A. Schwartz, Mgr., Research, National Malleable and Steel Castings Co. Pitman Publishing Co. $6.50.

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Technical Lettering Practice, by Henry Cecil Spenser and Hiram E. Grant. The MacMillan Company. $1.35

Designed to be used in conjunction with Technical Drawing by Giesecke, Mitchell, and Spenser, but may be used with any other good text on technical or engineering drawing. Complete alphabets are printed for reference.

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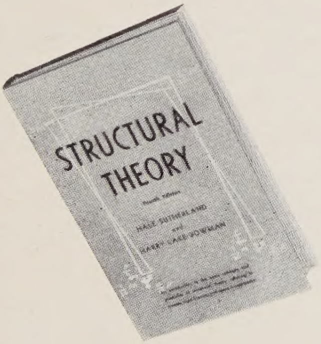

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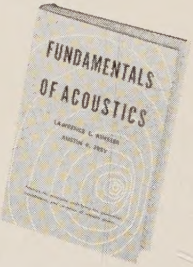

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